

DEVELOPMENT REVIEW BOARD SUPPLEMENTAL SUBMITTAL

(Deadline is Friday at noon unless noted on DRB calendar – late submittals will not be accepted unless approved by the DRB)

PROJECT NO. <u>PR-2021-005566</u> Application No. <u>SI-2021-01212</u>

TO:

____ Planning Department/Chair

____Hydrology

VTransportation Development

____ ABCWUA

____ Code Enforcement

____ Parks & Rec

*(Please attach this sheet with each collated set for each board member)

NOTE: ELECTRONIC VERSION (ie disk, thumbdrive) is Required. Submittal will not be accepted without.

DRB SCHEDULED HEARING DATE: <u>November 3, 2021</u> HEARING DATE OF DEFERRAL: <u>Oct. 27. 2021</u>

SUBMITTAL DESCRIPTION: Transportation Memo

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Civil Transformations Inc. 2929 Coors Blvd. NW, Ste. 309 Albuquerque, NM 87120-1425 505.508.3374 www.civiltransformations.com



Memo

To: Jeanne Wolfenbarger, PE

From: Timothy D. Simmons, PE, PTOE / intelly D. Summons

CC: Distribution

Date: November 2, 2021

Re: SAMS Academy On-Site Queuing Analysis

Background

As part of the "NIA Ordinance" (City of Albuquerque [COA] Bill No. O-13-61), evaluation is required of "*site design features such as turning lanes, median cuts, queueing requirements and site circulation,...*" along with other transportation elements. This memorandum summarizes the queuing analysis performed for the referenced project and is a supplement to the Traffic Impact Study (TIS), dated 08/09/2021 and approved by COA.

Methodology

The TIS included capacity and queuing analyses of the study area intersections and two (2) site driveways. Queuing calculations were in accordance with the Highway Capacity Manual (HCM) 6th Edition. However, neither the HCM nor the COA Development Process Manual (DPM) prescribe a methodology to analyze site traffic queues associated with school drop-off or pick-up operations. Therefore, the Municipal School Transportation Assistance (MSTA) School Traffic Calculator (NCDOT, 2016) was utilized to estimate on-site traffic queues for this project. Documentation for this procedure can be found at: https://connect.ncdot.gov/municipalities/School/Pages/default.aspx.

The (MSTA) developed a school traffic calculator based on data collected from schools across North Carolina. The calculator used input such as number of students, staff members, and number of buses to estimate how many trips the school would be expected to generate from which queue lengths are estimated for evaluation of impacts from school traffic interfering with adjacent public roadway operations. Important features of this methodology should be noted as follows:

- The data provided by this calculator indicates charter schools in higher populated areas have a significantly higher percentage of parents driving their students to and from school.
- The proprietary mathematical models developed in this procedure included urban schools that were situated along public roadways, i.e., the drop-off/pick-up zones were in the public roadway rather than on-site.
- Furthermore, the estimated trips are higher than those resulting from the Institute of Transportation Engineers (ITE) Trip Generation Manual.

• Therefore, this methodology is conservative as noted in "Operations and Safety Around Schools: Overview of Project Activities and Findings" (Texas Transportation Institute, January 2004; p. 5-24).

Assumptions

Reference is made to the TIS for pertinent data used in this analysis.

- 1. School Capacity.
 - a. The proposed school facility will have a capacity of 300 students in grades 6-12; assumed distribution is
 - i. Middle school = 75 students
 - ii. High school = 225 students (56 high school students per grade level)
 - b. Staff and students would not all be expected to arrive during the same period.
 - c. Bus service will be provided.
- 2. Staggered School Schedule. Grades 11 and 12 utilize an online learning model where 50% of learning occurs virtually and 50% is in person on alternate days; thus, these grade levels do not all attend concurrently.
- **3. Site Access**. Site access is proposed via two driveways as shown on the Traffic Circulation Layout (TCL, **Attachment 1**) and described below:
 - a. **Driveway 1** a right-in/right-out (RIRO) access driveway at Irving Blvd.; drop-offs (and pick-ups) will circulate in a counter-clockwise direction in order to drop students off on the right side of the vehicle at the northwest sidewalk.
 - b. **Driveway 2** a full access driveway on Ventana at Scottsdale; drop-offs (and pickups) will circulate in a counter-clockwise direction in order to drop students off on the right side of the vehicle at the sidewalk adjacent to the front of the building.
 - c. Arriving staff, self-driving students, and visitors who arrive during the analysis period will park in the designated spaces and not enter the drop-off/pick-up queues.
 - d. Bus drop-offs will be designated at the southeast sidewalk and separate from parent drop-offs.
 - e. The number of peak hour traffic trips entering/exiting the site is summarized in the table below (totals are rounded):

Driveway 1	% In	% Out	Trips In	Trips Out
AM Peak	70	30	71	17
PM Peak	20	25	4	6
Driveway 2	% In	% Out	Trips In	Trips Out
AM Peak	30	70	30	41
PM Peak	80	75	16	18
		Totals:		
AM Total			102	59
PM Total			21	24

Table 1: Driveway distribution

- **4. Bus Transport.** Currently, 75 students are bused to the existing school campus; it is further assumed that:
 - a. 25 middle and
 - b. 50 high school students are bused.

- c. Deducting bused students from arrivals yields (see Attachment 2):
 - i. Driveway 1 Entering Trips = 54
 - ii. Driveway 2 Entering Trips = 23
- d. A deduction for bused or walking students was not included in the TIS for a more conservative analysis.

Application of MSTA Model

Following is a summary of the inputs for the MSTA School Calculator.

- SAMS Academy is in a Suburban setting; used "Private Non-urban Charter" module.
- Buses: not input as entering trips were adjusted to account for bused students (numbers listed below entry fields are self-populated by the model).
- Student and Staff numbers were apportioned by grade levels.
- Using the ITE estimated driveway trips listed in 4.d. above for normal conditions yields the following (see **Attachment 3**):
 - Driveway 1 average queue length = 201 feet
 - Driveway 2 average queue length = 112 feet

"Worst-Case Scenario"

COA staff requested a hypothetical analysis scenario in which 11th & 12th grades are not staggered but attend concurrently and student busing is not provided. Following are the inputs and results (see **Attachment 4**):

	Entering	Average	Available			
Driveway	Students	Queue (ft)	Storage (ft)			
1	210 (70%)	601	412			
2	90 (30%)	267	488			
Total	300	868	900			

With reference to the site TCL (Attachment 1), the following observations were made:

- Total available queue storage (900 feet) is sufficient to accommodate the "worst-case" scenario.
- The Driveway 1 "worst-case" queue of 601 feet would exceed the available storage of 412 feet by 189 feet (about 8 vehicles).
- In this scenario, student drop-offs could be directed to redistribute to Driveway 2 in order to alleviate the excess queue.
- From the SAMS Academy Traffic Impact Study (August 2021):
 - Estimated school entering traffic at Irving driveway: AM Peak EBR = 71 veh/hour
 - Horizon year (2032) AM Peak EBT = 171 veh/hour
 - Irving Blvd. is a 35 mph 4-lane Principal Arterial: capacity = 3390 vphpl (per MRCOG)
 - Assume:
 - EBT curb lane is blocked during morning school drop-off
 - Inside EBT lane capacity = 3390/4 = 848 vphpl
 - Volume-to-capacity ratio v/c = 171/848 = 0.202
 - This demonstrates that there is ample capacity of 80% remaining in the inside eastbound through lane to accommodate an additional 677 vehicles should the outside EBT lane be temporarily blocked by school traffic during the horizon year AM peak period.
 - Furthermore, if there was a delay in on-site traffic circulation leading to a backup, it would be a very short term impact:

- Using the MSTA School Calculator loading time of 40 seconds/vehicle, this translates to and arrival rate 1.5 vehicles per minute.
- 8 vehicles would clear the outside through lane in less than 5 minutes (8 veh ÷ 1.5 veh/min = 4.67 min.).

Conclusion

Based on the conservative MSTA model used to estimate on-site traffic volumes, the following conclusions were drawn:

- Sufficient queuing space is available to accommodate the "worst-case" scenario of all 300 students arriving during the AM peak hour provided arrivals are distributed proportionately.
- Should a delay cause excess queuing at Driveway 1 on Irving Blvd., sufficient capacity in the inside travel lane is available without impeding through traffic on Irving.
- Normal school operations would not be expected to impact adjacent roadways given the conservative MSTA estimate, staggered school schedule, available queue storage, and separate drop-off versus parking operations.

Therefore, it is this engineer's opinion that no further mitigation measures would be necessary as eastbound Irving Blvd. has ample capacity to accommodate through traffic without being impeded by a potential school traffic queue.

Attachments: 1 – Traffic Circulation Layout (TCL)

- 2 Bus Trip Adjustment
- 3 MSTA School Traffic Calculations (normal access)
- 4 MSTA School Traffic Calculations (worst-case scenario)
- Distribution: Matt Grush, City Traffic Engineer Steven Hernandez, DMC Consultants Ron Hensley, THE Group



ATTACHMENT 1

SCHOOL ARRIVAL INFORMATION

MID-SHOOL AND HIGH SCHOOL ARRIVE ON STAGGERED SCHEDULES

STUDENTS WORK REMOTELY PART OF THE WEEK FROM HOME, SO THEY HAVE STAGGERED SCHEDULES FOR THE DAYS THEY ATTEND SCHOOL IN THE BUILDING, EITHER A MW SCHEDULE OR A T,TH SCHEDULE

STUDENTS ARE BUSED TO THE SCHOOL FROM VARIOUS LOCATIONS.



	Type:	Urban Ch	arter					Version:		102816	1	
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t	Number	Staff	Student	Total	Peak	Queue	Total AM	Total PM	High D	emand	CKISTS , CKISTS , THE SHEET VES	te N AENDEL
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From TIS Table 3

ITE			Daily		АМ		PM				
Code	Quantity	Units	Total	Enter	Exit	Total	Enter	Exit	Total		
522	75	Students	276	24	20	44	6	7	13		
530	225	Students	718	78	39	117	15	17	32		
Totals	300		994	102	59	161	21	24	45		
	_	Adj	ust for 75	students	transport	ed via bus	s:	_	_		
522	50	Students	200	16	13	29	4	5	9		
530	175	Students	593	61	30	91	12	13	25		
Totals	225		793	77	43	120	16	18	34		

From TIS Table 4 Adjusted for bus:										
Driveway 1	% In	% Out	Trips In	Trips Out	Trips In	n Trips Ou				
AM Peak	70	30	71	17	54	13				
PM Peak	20 25		4	6	3	5				
Driveway 2	% In	% Out	Trips In	Trips Out	Trips In	Trips Out				
AM Peak	30	70	30	41	23	30				
PM Peak	80	75	16	18	13	14				

ATTACHMENT 3 MSTA School Traffic Calculations AM and PM Peak Traffic Estimates (These numbers do not reflect peak hour traffic volumes)

School Name: SAMS Academy, Driveway 1

							Туре:	Private / Non-u	urban Charter	Version: 102816					
						MSTA S	chool Que	ue Input				Calcu	lations		
AM Cars / Student	PM Cars / Student	Avg. Car Length	PM At one Time		Grade Level	Student Population	Number of Buses	Staff Members	Student Drivers	PM Total Vehicles	PM Peak Vehicles	Average Queue Length	Total AM Trips	Total PM Trips	High Demand Length
55.94%	39.15%	22.19	48.67%		Pre-K & K										30%
43.35%	26.30%	22.00	37.87%		1-10	38				10	4	88	33	20	114
52 01%	47 50%	22.10	46 12%		11th	8	1	5		1	2	44	8	8	58
52.5170	47.5070	22.13	40.1270			0	0	1	3	+	2				30
50.08%	47.58%	22.83	55.71%		12th	8	0	1	7	4	3	68	8	8	90
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Pre-K & K loa "PM Peak	ading is us Vehicles"	ually park indicates r	and walk minimum												61
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11th and 12th grades which makes						AM Pre-	K-K Trips			PM PK	-K Trips				
adjustmen	nts for stud	ent drivers													
							AM T	rips Generated	1-10		PM Trips Generated				
					Direction	Parents	Buses	Staff	Trips	Parents	Buses	Staff	Trips		
					IN	16			16	10			10		
					OUT	16			16	10	DMUK		10		
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				Direction	Parents	Buses	Staff		Trips	Parents	Buses	Staff		Trips	
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time perio	d. (justifyir	ng a PHF c	f 0.5)	OUT	4				4	4				4	
							AM 12	2 Trips	8			PM 12	? Trips	8	16
								In	25				In	18	
							TRIPS	Out	25			TRIPS	Out	18	05
								lotal	49				lotal	36	85

ATTACHMENT 3 MSTA School Traffic Calculations AM and PM Peak Traffic Estimates (These numbers do not reflect peak hour traffic volumes)

School Name: SAMS Academy, Driveway 2

				Type: Private / Non-urban Charter										Version:	102816
						MSTA S	chool Que	ue Input				Calcu	lations		
AM Cars / Student	PM Cars / Student	Avg. Car Length	PM At one Time		Grade Level	Student Population	Number of Buses	Staff Members	Student Drivers	PM Total Vehicles	PM Peak Vehicles	Average Queue Length	Total AM Trips	Total PM Trips	High Demand Length
55.94%	39.15%	22.19	48.67%		Pre-K & K				l						30%
43.35%	26.30%	22.00	37.87%		1-10	17				5	2	44	15	10	57
52.91%	47.50%	22.19	46.12%		11th	3	0	2		2	1	22	3	4	29
50.08%	47.58%	22.83	55.71%		12th	3	0	0	1	2	2	46	3	4	60
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normally o	ccur withi	n a 30-min	ute	IN	2				2	2				2	
time period	d. (justifyir	g a PHF o	of 0.5)	OUT	2				2	2		DM 1		2	7
							AIVI		3					4	
							All AM	In	10			All PM	In	9	
							TRIPS	Total	21			TRIPS	Total	18	39

ATTACHMENT 4 MSTA School Traffic Calculations AM and PM Peak Traffic Estimates (These numbers do not reflect peak hour traffic volumes)

									Worst-cas	e scenario)"		
				School Name: SAMS Academy - Irving Entr				ice at /0%					
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AM PM Avg. Cars / Cars / Car Student Student Length	PM At one Time		Grade Level	Student Population	Number of Buses	Staff Members	Student Drivers	PM Total Vehicles	PM Peak Vehicles	Average Queue Length	Total AM Trips	Total PM Trips	High Demand Length
													30%
55.94% 39.15% 22.19	48.67%		Pre-K & K										
43.35% 26.30% 22.00	37.87%		1-10	130.9				35	14	308	115	72	400
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Pre-K & K loading is usually park a	and walk										<u>.</u>		181
"PM Peak Vehicles" indicates n	ninimum												-
number of parking spaces need	ded.				AM T.	ine Concreted			DM T	rine Concreted			
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percentages for all school types	s except		OUT										ADT
11th and 12th grades which ma	akes				AM Pre-	K-K Trips			PM PK	-K Trips			
adjustments for student drivers							4.40					1	
					AM T	ips Generated	1-10		PM T	rips Generated			
			Direction	Parents	Buses	Staff	Trips	Parents	Buses	Staff	Trips		
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			OUT	57	2		59	35			35		107
					AM K-1	0 Trips	115		PM K-	10 Trips	72	l	187
							11th						
NOTES					AM Ti	rips Generated			PM T	rips Generated			
		Direction	Parents	Buses	Staff	Student Dvr	Trips	Parents	Buses	Staff	Student Dvr	Trips	
- Average Queue Length does	<u>not</u>	IN	12	4		16	28	11	1		40.0	12	
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which is usually 30% additional	l length			l		The					i inpo	40	
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include the Student Loading Zo	one.			AN	/ Trips Genera	ted			PI	M Trips Genera	ited		
 Peak traffic volumes at schools 		Direction	Parents	Buses	Staff	Student Dvr	Trips	Parents	Buses	Staff	Student Dvr	Trips	
normally occur within a 30-minu	ute		11	1		16	27	11	1		20	12	-
une period. Jusuiying a PHF o	10.5)			I	AM 12	2 Trips	40	11		PM 1	2 Trips	43	82
					All AM	In	112 84			All PM	In Out	61 96	-
					TRIPS	Total	196			TRIPS	Total	157	354